

1974-02-01

Early Action Program Report Submitted to the Great Lakes Water Quality Board by the International Reference Group on Great Lakes Pollution from Land Use Activities

International Reference Group on Great Lakes Pollution From Land Use Activities

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EARLY ACTION PROGRAM
REPORT

GLC 22222 23

Submitted To The

GREAT LAKES WATER
QUALITY BOARD

By The

INTERNATIONAL REFERENCE GROUP
ON GREAT LAKES POLLUTION FROM
LAND USE ACTIVITIES

February 1974

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1974



INTERNATIONAL JOINT COMMISSION
INTERNATIONAL REFERENCE GROUP
ON GREAT LAKES POLLUTION FROM
LAND USE ACTIVITIES



EARLY ACTION PROGRAM

REPORT

March, 1973

Submitted To The

GREAT LAKES WATER
QUALITY BOARD

Chairmen
Great Lakes Water Quality Board

By The

INTERNATIONAL REFERENCE GROUP

Gentlemen:

ON GREAT LAKES POLLUTION FROM

In response to the May 18, 1973 request of the Board, the Reference Group on Great Lakes Pollution from Land Use Activities takes pleasure in submitting an Early Action Program Report.

Respectfully submitted,

February 1974

Canada

United States

Murray G. Johnson
Chairman

Norman A. Berg
Chairman

Chairman

Murley C. Johnson

Chairman

Norman A. Boyd

Canada

United States

Respectfully submitted,

Early Action Program Report.

Land Use Activities Lakes pleasure in submitting an
board, the Reference Group on Great Lakes Pollution from

In response to the May 18, 1973 request of the

Gentlemen:

Chairman
Great Lakes Water Quality Board

March, 1973

LAND USE ACTIVITIES
ON GREAT LAKES POLLUTION FROM
INTERNATIONAL REFERENCE GROUP
INTERNATIONAL JOINT COMMISSION

1. INTRODUCTION

The Governments of Canada and the United States, pursuant to Article IV of the Great Lakes Water Treaty of 1909 requested the International Joint Commission on April 15, 1972 to conduct a study of pollution of the boundary waters of the Great Lakes System from agricultural, forestry and other land use activities. In light of the provision of Article IV of the treaty which provides that the boundary waters and waters flowing across the boundary shall not be polluted on either side, and in accordance with the Great Lakes Water Quality Agreement signed on April 15, 1972.

EARLY ACTION PROGRAM

REPORT

Submitted To The

GREAT LAKES WATER
QUALITY BOARD

By The

The two Governments requested the Commission to inquire into and report upon the following matters:

- (1) Are the boundary waters of the Great Lakes System being polluted by land use activities? If so, what are the sources of runoff and surface water pollution from agricultural, forestry, urban and industrial land use activities, and from land development, and what are the natural sources?
- (2) If the answer to the first question is in the affirmative, to what extent is the pollution, and in what localities is the pollution most serious?
- (3) If the Commission finds that the pollution of the character just referred to is taking place, what remedial measures would be required, and what would be the program for their implementation?

February 1974

The Commission was further requested to consider the necessity of existing programs and control measures, and the need for improvements therein, relating to:

- (a) inputs of nutrients, pest control products, sediments and other pollutants from the sources referred to above;

February 1974

LAND USE ACTIVITIES
ON GREAT LAKES POLLUTION FROM
INTERNATIONAL REFERENCE GROUP

By the

QUALITY BOARD
GREAT LAKES WATER

Submitted to the

REPORT

EARLY ACTION PROGRAM

I. INTRODUCTION

The Governments of Canada and the United States, pursuant to Article IX of the Boundary Waters Treaty of 1909 requested the International Joint Commission on April 15, 1972 to conduct a study of pollution of the boundary waters of the Great Lakes System from agricultural, forestry and other land use activities, in the light of the provision of Article IV of the treaty which provides that the boundary waters and waters flowing across the boundary shall not be polluted on either side to the injury of health and property on the other side, and in the light also of the Great Lakes Water Quality Agreement signed on April 15, 1972.

The two Governments requested the Commission to inquire into and report upon the following questions:

- (1) Are the boundary waters of the Great Lakes System being polluted by land drainage (including ground and surface runoff and sediments) from agriculture, forestry, urban and industrial land development, recreational and park land development, utility and transportation systems, and natural sources?
- (2) If the answer to the foregoing question is in the affirmative, to what extent, by what causes, and in what localities is the pollution taking place?
- (3) If the Commission should find that pollution of the character just referred to is taking place, what remedial measures would in its judgment, be most practicable, and what would be the probable cost thereof?

The Commission was further requested to consider the adequacy of existing programs and control measures, and the need for improvements thereto, relating to:

- (a) inputs of nutrients, pest control products, sediments and other pollutants from the sources referred to above;

and other pollutants from the sources referred to above;

(b) source of untreated pest control products, pesticides and other chemicals (insecticides, repellents, etc.) used for fumigation, etc., relating to

effectiveness of existing programs and control measures; and the

The Commission has further requested to consider the

(c) If the Commission should find that pollution of the

(2) In the event no land disposal question is in the

and future land development, recreational and park

The two Governments requested the Commission to provide

dated Quality Agreement signed on April 12, 1973.

on the other side and in the light also of the Great Lakes

The Government of Canada and the United States

INTRODUCTION

- (b) land use;
- (c) land fills, land dumping, and deep well disposal practices;
- (d) confined livestock feeding operations and other animal husbandry operations; and
- (e) pollution from other agricultural, forestry and other land use sources.

In carrying out its study, the Commission was requested to identify deficiencies in technology and recommend actions for their correction. The Commission was also asked to submit its report and recommendations as soon as possible and to submit reports from time to time on the progress of its investigations.

In November, 1972 the International Joint Commission appointed a Reference Group on Land Use Activities composed of nine Canadian and nine United States' representatives to carry-out the study under the direction and supervision of the Great Lakes Water Quality Board.

Subsequently, in Directive Number 1, the Water Quality Board requested the Reference Groups to prepare and submit a study outline, schedule and cost estimate. In addition, the Reference Group was directed to take into account the request of the Governments for a report as soon as possible. The Board noted, however, that "the report must be responsive to the questions posed in the reference." Later, at its May 18, 1973 meeting, the Water Quality Board requested the Reference Group to submit "an early action program report regarding action programs which should be implemented without waiting for the completion of the Reference Study." This report, therefore, is submitted in response to the May 18, 1973 request of the Water Quality Board.

request of the Water Quality Board.

report. Therefore, as stipulated in response to the May 18, 1973 mailing for the completion of the Reference Study. This regarding action programs which should be implemented without Reference Group to submit "an early action program report May 18, 1973 meeting. The Water Quality Board requested the to the questions posed to the Reference. Later, at its The Board noted, however, that "the report must be responsive request of the Government for a report as soon as possible. The Reference Group was directed to take into account the a study outlining benefits and cost estimates. In addition, Board requested the Reference Group to prepare and submit subsequently. In Directive Number 1, the Water Quality the Great Lakes Water Quality Board.

to carry out the study under the direction and supervision of of nine Canadian and nine United States representatives appointed a Reference Group on Land Use Activities composed In November, 1973 the International Joint Commission investigations

submit reports from time to time on the progress of its its report and recommendations as soon as possible and to for their correction. The Commission was also asked to submit to identify deficiencies in technology and recommend solutions in carrying out the study. The Commission was requested

- (a) Pollution from other agricultural, forestry and other land use sources.
- (b) Pollution from other agricultural, forestry and other land use sources; and
- (c) continued livestock feeding operations and other animal practices;
- (d) land filling, land dumping, and deep well disposal;
- (e) land use;

IT EARLY ACTION PROGRAM

Recommendations for early action by the Governments are included for seven specific areas of concern. The report was prepared primarily by the Reference Group's Task A Committee. Considerable input was also realized from the workshop sponsored by the Reference Group at the University of Guelph, Guelph, Ontario on September 11 and 12, 1973 which focused on land use and water quality interrelationships. No additional research efforts are included in the recommended program as research recommendations are the central concern of the Commission's Research Advisory Board.

The recommended early action program focuses chiefly on that part of the terms of reference wherein the International Joint Commission is requested to consider the adequacy of existing programs and control measures, and the need for improvement relating to various land use activities. Conclusions supported by sufficient documentation and recommended remedial measures regarding the major questions posed by the Governments in the terms of reference must await further indepth investigation. The Reference Group has formulated and initiated implementation of a comprehensive study plan for such investigation. It should be clear that the recommended early action program in no way lessens the necessity or the justification for this investigation.

the justification for this investigation.

early action program in no way lessens the necessity or for each investigation. It should be clear that the recommended and initiated implementation of a comprehensive study plan indeed necessitates the Reference Group has formulated the Government's in the form of reference must await further remedial measures regarding the major questions posed by conclusions supported by sufficient documentation and recommendations for improvement relating to various land use activities of existing programs and cultural resources, and the need joint Commission is requested to consider the adequacy on the part of the terms of reference wherein the international

The recommended early action program focuses chiefly Advisory Board.

actions are the central concern of the Commission's research included in the recommended program as research recommendations investigations. No additional research efforts are and is, 1953 which focused on land use and water quality University of Guelph, Guelph, Ontario on September 11 from the workshop sponsored by the Reference Group at the task A Committee. Considerable input was also received report was prepared primarily by the Reference Group's and included for seven specific areas of concern. The

Recommendations for early action by the Government

II EARLY ACTION PROGRAM

The following recommendations constitute the early action program recommended by the Reference Group.

The Great Lakes system is fundamentally linked to the spatial form, type and practice of land uses in the Great Lakes Watershed. Land resources possess a myriad of intrinsic qualities - including dimensions of ecology, hydrology, climate, topography, vegetation, etc. - which taken together circumscribe the capability of land resource units to sustain particular land uses and activities. Historically, ecologically irresponsible land use practices coupled with inefficient or nonexistent land planning and control programs have degraded surface and ground water quality in the Great Lakes watershed. Thus, on-land liquid and solid waste disposal programs have failed due to unsuitable site characteristics, shoreline erosion has been accelerated by improper placement or design of navigation structures, and increased siltation has resulted from excessive land-clearing and earth-moving activities.

Problems associated with land use practices can often be resolved by the application of control technology but both the dollar and other costs of controls may be substantial. Moreover, the sprawling, incremental nature of such recent development renders it difficult and expensive to implement effective environmental protection measures. Land use activities are highly interdependent and are closely linked to growth generators such as manufacturing, industry, commercial development, etc. Consequently, land use planning efforts proceed in a piecemeal fashion and discretionary rather than anticipatory, and are not as effective as they could be.

action program recommended by the Reference Group.

The following recommendations constitute the early

11 EARLY ACTION PROGRAM

A. LAND USE PLANNING

Problem Description:

The impact of land drainage on the water quality of the Great Lakes system is fundamentally linked to the spatial form, type and practice of land uses in the Great Lakes Watershed. Land resources possess a myraid of intrinsic qualities - including dimensions of geology, hydrology, climate, topography, vegetation, etc. - which taken together circumscribe the capability of land resource units to sustain particular land uses and activities. Historically, ecologically irresponsible land use practices coupled with ineffective or nonexistent land use planning and control programs have degraded surface and ground water quality in the Great Lakes watershed. Thus, on-land liquid and solid waste disposal programs have failed due to unsuitable site characteristics, shoreland erosion has been accelerated by the improper placement or design of navigation structures, and increased soil erosion has resulted from numerous land-clearing and earth-moving activities.

Problems associated with land use practices can often be resolved by the application of control technology but both the dollar and other costs of controls may be substantial. Moreover, the sprawling, incremental nature of much recent development renders it difficult and expensive to implement effective environmental protection measures. Land use activities are highly interdependent and are greatly influenced by such growth generators as new transportation facilities, industry and recreational developments. Often, environmental protection efforts proceed in a piecemeal fashion, are reactionary rather than anticipatory, and must act in a framework limited by previous actions and commitments.

previous actions and commitments.

Even antiquity, and what add to a framework limited by efforts projected in a piecemeal fashion, are frequently narrow and recreational developments. Often, environmental protection grows generations as new transportation facilities, industry are highly interdependent and are greatly influenced by such effective environmental protection measures. Land use activities development renders it difficult and expensive to implement. Moreover, the spiraling environmental impact of such recent the dollar and other costs of controls may be substantial, be resolved by the application of control technology but both

Problems associated with land use practices can often moving activities.

Erosion has resulted from numerous land-clearing and earth-ment or design of navigation structures, and increased soil shortland erosion has been accelerated by the improper planning programs have failed due to unaffordable site characterization, watershed. Thus, on-land liquid and solid waste disposal degraded surface and ground water quality in the Great Lakes non-existent land use planning and control programs have responsive land use practices coupled with ineffective or partialized land uses and activities. Historically, ecologically circumstances the capability of land resource units to sustain climate, topography, vegetation, etc. - which taken together degraded - including dimensions of geology, hydrology, watershed, land resources possess a myriad of intrinsic form, type and practice of land uses in the Great Lakes the Great Lakes system is fundamentally linked to the spatial

The impact of land drainage on the water quality of

Problem description:

LAND USE PLANNING

It is the consensus of the Land Use Activities Reference Group that water quality problems associated with land drainage cannot be effectively and economically approached on a case-by-case basis, independent of the total land resources allocation and development process. Rather, it is vital that new procedures, institutions and programs be implemented to guide and manage the use and development of society's land resources in a manner that is fully integrated with environmental protection efforts. In summary, it is the conclusion of the Land Use Activities Reference Group that a promising avenue to the minimization of future pollution attributable to land drainage is the establishment of more effective land use planning and control programs throughout the Great Lakes Basin.

In addition, land use planning and control programs generate high public interest based on general environmental concerns and the fundamental concept in our society of private property. Successful implementation of such programs will be jeopardized unless due recognition is afforded to participation by the general public and environmental and other interest groups from the initial stages. The approach would seek the involvement of those who wish to participate in order to bring out all views, both positive and negative, and to allow full consideration of such views prior to the time of final decision.

Recommendation:

It is recommended that the Governments acting on a priority basis, take all appropriate steps to foster, facilitate and support increased land use planning and management programs by regional and state/provincial governmental units and interstate processes throughout the Great Lakes Basin. Adequate provision for public participation should be an integral component of these programs. Furthermore, Canada and the United States, and

land programs, techniques, laws and the initial action and for public participation should be an integral component of programs throughout the Great Lakes Basin. Adequate provision technical and administrative personnel and management personnel support increased land use planning and management programs by basin, take all appropriate steps to foster, facilitate and

It is recommended that the Government acting on a national

Recommendation

of such views prior to the time of final decision.

Views, both positive and negative, and to allow full consideration of those who wish to participate in order to bring out all the initial stages. The approach would seek the involvement general public and environmental and other interest groups from through the recognition is allocated to participation by the successful implementation of such programs will be independent and the fundamental concept in our society of private property, high public interest based on general environmental concerns

In addition, land use planning and control programs generate and control programs throughout the Great Lakes Basin drainage is the establishment of more effective land use planning

The minimization of future pollution to land land use activities reference group that a provision even to protection efforts. In summary, it is the coordination of the resources in a manner that is fully integrated with environmental needs and manage the use and development of society's land new procedures, institutions and programs be implemented to allocation and development process. Rather, it is vital that by-case basis, independent of the total land resources cannot be effectively and economically approached on a case-group that water quality problems associated with land drainage

It is the concern of the land use activities reference

specifically the I.J.C., should examine concepts and options for a bilateral planning process in areas where land use planning may mitigate environmental problems of international concern.

In the United States, a first step in the realization of this recommendation would be the prompt enactment and adequate funding of national land use planning assistance legislation, and the expeditious implementation of the National Coastal Zone Management Act by the states and Federal Government. Both of these programs would provide substantial funding and encouragement to states for the establishment of land use planning programs.

claims.

not to stress for the establishment of land use planning programs these programs would provide substantial funding and encourage Management Act by the states and Federal Government. Both of and the expeditions implementation of the National Coastal Zone Funding of national land use planning and education. This recommendation would be the product education and education in the United States, a first step in the realization of concepts.

Planning may mitigate environmental problems of international for a bilateral planning process in areas where land use specifically the U.S.C. should examine concepts and options

B. CERTIFICATION AND REGULATORY LEGISLATION

FOR WASTE MANAGEMENT SYSTEMS

Problem Description:

Ample evidence, drawn from field experiences as well as research activities, has demonstrated that utilization/disposal activities have polluted both surface and ground water supplies. Further evidence points to the fact that this pollution load does impact Great Lakes water quality to significant degrees.

Comprehensive and compatible regulations regarding all phases of the disposal of liquid and solid wastes on land have not been established. Therefore, a program of upgrading abatement systems and minimizing pollution from these activities cannot be adequately implemented.

After appropriate agencies have formulated regulations applying to management of municipal and industrial liquid and solid waste systems and sites, other impediments to implementation may arise. Adequate funding may not be available. The program may not be assigned sufficiently high priority to ensure its timely implementation. Technically competent staff (such as geologists, hydrogeologists, biologists, agriculturalists, engineers, etc) may not be available to assess the efficiency of the program and recommend any changes as they become necessary.

It is recognized that in most areas, adequate legislation presently exists to offer effective management; however, policing, monitoring, analyzing and ensuring that sufficient control and supervision are maintained is not always possible because of staff limitations.

Public education to enlist public participation and accelerated acceptance of these areas of material utilization

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solid waste systems and sites, other impediments to implementation
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After appropriate agencies have formulated regulations

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phases of the disposal of liquid and solid wastes on land have
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Problem Description:

WASTE MANAGEMENT SYSTEMS

II. CHARACTERIZATION AND REGULATORY LEGISLATION

C. LAND DISPOSAL AND TREATMENT OF WASTE WATERS

and disposal by communities, industry, governments, groups and individuals is lacking. A mechanism to involve those not directly concerned with the regulatory enforcement and control of disposal activities is not generally available.

In Canada, the regulatory authority rests at the Provincial level. Recent legislation covering the land application of liquid processed organic waste will provide the necessary control. Certain industrial waste disposal practices are not satisfactorily documented and adequate management programs have not been instituted to minimize the environmental impacts arising from this activity.

Recommendation:

(1) Existing legislative and regulatory authority regarding all phases of waste management systems involving the utilization and disposal of liquid and solid wastes on land should be evaluated to ascertain if all aspects are compatible, comprehensive and approach the same objective in a complementary and co-ordinated program. Deficiencies and gaps should be remedied by the enactment of legislation or regulations as warranted.

(2) Sufficient funding should be made available to ensure adequate technical and administrative capability to police, monitor, analyze and ensure sufficient control and supervision of systems involving the application of wastes on land.

(3) Education programs should be established and funded focusing on all levels of the community including individuals, municipal entities, and the private enterprise sector to foster a proper understanding and appreciation of particular applications of wastes on land and to encourage consideration of the potentials and benefits that may be realized from the utilization of wastes, wherever possible.

utilization of wastes wherever possible.

The potentials and benefits that may be realized from the applications of wastes on land and to encourage consideration of lower a proper understanding and appreciation of particular municipal entities, and the private enterprise sector to focusing on all levels of the community including individuals.

(3) Education programs should be established and funded of systems involving the application of wastes on land, monitor, analyze and ensure sufficient control and supervision adequate technical and administrative capability to police.

(8) Sufficient funding should be made available to ensure of legislation or regulations as warranted.

Program. Deficiencies and gaps should be remedied by the enactment approach the same objective in a complementary and co-ordinated to ascertain if all aspects are compatible, comprehensive and and disposal by land and solid wastes on land should be evaluated all phases of waste management systems involving the utilization

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Recommendations:

to minimize the environmental impacts arising from this activity. Documented and adequate management programs have not been identified certain industrial waste disposal practices are not satisfactorily processed organic waste will provide the necessary control level. Recent legislation covering the land application of

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concerned with the regulatory enforcement and control of disposal initiatives is lacking. A mechanism to involve those not directly and disposal by communities, industry, governments, groups and

C. LAND DISPOSAL AND TREATMENT OF WASTE WATERS

Problem Description:

Land disposal and treatment of sewage effluents, sewage sludge, and various other waste waters have been practiced for a number of years. Only within the last 10 years, however, have more detailed water quality and related monitoring studies been conducted in conjunction with some of these land disposal projects. The method has a great potential within the Great Lakes Watershed for small communities, subdivisions, and metropolitan regions alike under a wide range of soils, geological and hydrological conditions. Waste waters can be put to beneficial use as a source of irrigation water, pollution in waterways can be reduced, nutrients can be reclaimed for beneficial use through land and crop management, and satisfactory groundwater recharge can be achieved where conditions are suitable.

Waste-water irrigation systems have specific site requirements, and not all lands will be suitable for waste-water renovation. Suitable areas may or may not be in close proximity to waste-water treatment plants, and it will be necessary to define suitable regions and include them as a physical factor in environment planning and land-management studies.

Waste-water irrigation systems are in use that have caused local pollution and have caused secondary environmental problems under a variety of field conditions. Application rates have exceeded the infiltration capacity of the soil, amounts of water applied and prolonged recharge have caused water logging and drainage problems, waste materials have been irrigated that are not biodegradable or renovated by physical or geochemical processes operating within the soil-water and ground-water systems, nutrients have not been removed from irrigation sites by crop management, etc. Other failures

irrigation sites by crop management, etc. Other failures around-water systems, nutrients have not been removed from or geochemical processes operating within the soil-water and irrigated that are not disadvantages or removed by physical water logging and the have problems, waste materials have been amounts of water applied and prolonged technique have caused rates have exceeded the infiltration capacity of the soil.

Problems under a variety of field conditions. Application caused local pollution and have caused secondary environmental

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land and crop management, and satisfactory groundwater recharge be reduced, nutrients can be reclaimed for beneficial use through use as a source of irrigation water. Pollution in waterways can and hydrological conditions. Waste waters can be put to beneficial metropolitan regions like under a wide range of soils, geological lakes watershed for small communities, subdivisions, and projects. The method has a great potential within the Great been conducted in conjunction with some of these land disposal have more detailed water quality and related monitoring studies a number of years. Only within the last 10 years, however, sludge, and various other waste waters have been practiced for land disposal and treatment of sewage effluents, sewage

Problem Description:

C. LAND DISPOSAL AND TREATMENT OF WASTE WATERS

(4) Under I.J.C. endorsement, agencies responsible for reviewing, policing, and monitoring land disposal systems also have occurred.

Many of the problem types observed could be eliminated through proper site selection, use of conservative engineering design, careful management of the irrigation system, and adoption of appropriate corrective action to solve minor problems not anticipated in design but isolated by routine monitoring, policing, etc.

Early action is possible to insure that the number of failures is kept to a minimum during this trial period when a number of new irrigation projects are being planned by people with limited experience, and new field conditions are being tested.

Recommendations:

(1) Regulations to insure that sites are properly selected, designs are conservative, and that the success of individual projects is demonstrated through monitoring programs are needed in all political regions.

(2) Because of the complexities involved in designing these projects, reviewing proposals, and insuring that systems are functioning properly, a more diversified base of training and experience is required of regulatory personnel or their consultants than is required for conventional waste treatment facilities. People knowledgeable in soils, geology, hydrology, in addition to civil and sanitary engineering, are required both at the design, design review, and regulatory level.

(3) Design modules and guide lines should reflect this complexity by requiring appropriate soils, geologic and hydrologic data be submitted with irrigation system plans, and regulatory agencies must acquire staff with these backgrounds.

regulatory agencies must acquire staff with these backgrounds, hydrologic data be submitted with irrigation system plans, and complexity by requiring appropriate soils, geologic and

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Many of the problem types observed could be eliminated also have occurred.

5. ANIMAL WASTE MANAGEMENT

(4) Under I.J.C. endorsement, agencies responsible for reviewing, policing, and monitoring land disposal systems should cooperate in establishing parallel regulations and in-house skills to insure that land disposal systems do not cause widespread pollution.

(5) Regional planning considerations are also involved in delineating suitable regions for waste-water treatment using land disposal methods. Significant land areas will be required to handle waste waters derived from metropolitan centers. Site requirements are specific and controlled by physical and chemical characteristics of the region. Suitable land disposal areas frequently are restricted in number, size, and location and should be defined, along with other compatible uses.

1. Installation of adequate manure storage facilities.

2. Good manure management with respect to handling, treatment and/or disposal.

Specific recommendations with respect to minimizing pollution from intensive livestock operations are made in a number of animal waste management guides and codes such as the "Canada Animal Waste Management Guide". Governmental agriculture personnel are charged with the responsibility of disseminating this information, making recommendations on what practices should be undertaken, and providing technical assistance; however, the priority accorded to this activity has not been adequate.

In the U.S., confined livestock operations of 1,000 animal units or more are required to obtain a permit under the provisions of the National Pollutant Discharge Elimination System. Effluent limitations, guidelines, and standards of performance are currently being promulgated for such feedlot operations by the U.S. Environmental Protection Agency.

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location and should be defined, along with other compatible disposal areas frequently are restricted in number, size, and and chemical characteristics of the region. Suitable land site requirements are specific and controlled by physical to handle waste waters derived from metropolitan centers, land disposal methods. Significant land areas will be required delineating suitable regions for waste-water treatment using (5) Regional planning considerations are also involved in cause widespread pollution.

in-house skills to insure that land disposal systems do not should cooperate in establishing parallel regulations and for reviewing, polluting, and monitoring land disposal systems

(4) Under U.S.C. endorsement, agencies responsible

D. ANIMAL WASTE MANAGEMENT

Problem Description:

Surface runoff and drainage from intensive animal husbandry operations can cause serious water pollution problems. In general, the extent of these problems has not been quantified but it is recognized that this source of pollutants can seriously degrade water quality at the local level.

Control of pollutants carried in surface water and drainage from intensive animal husbandry operations can be achieved by:

1. Site selection of new operations to minimize surface runoff and drainage problems.
2. Installation of adequate manure storage facilities.
3. Good manure management with respect to handling, treatment and/or disposal.

Specific recommendations with respect to minimizing pollution from intensive livestock operations are made in a number of animal waste management guides and codes such as the "Canada Animal Waste Management Guide". Governmental agriculture personnel are charged with the responsibility of disseminating this information, making recommendations on what practices should be undertaken, and providing technical assistance; however, the priority accorded to this activity has not been adequate.

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1. Good manure management with respect to handling.

2. Installation of adequate manure storage facilities.

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1. Site selection of new operations to minimize achieved by:

distance from intensive animal husbandry operations can be Control of pollutants carried in surface water and seriously degrades water quality at the local level.

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surface runoff and drainage from intensive animal husbandry

Problem Description:

D. ANIMAL WASTE MANAGEMENT

Similar regulations for smaller operations are in the development stage. In addition, an Agricultural Waste Management Field Manual is being developed and should be available sometime during the summer of 1974.

Recommendation:

It is recommended that education programs be strengthened to ensure that farmers are made aware of the problems and the various solutions available in order to minimize water pollution from intensive animal husbandry operations. In addition, technical assistance programs should be accelerated to enable farmers to establish adequate animal waste handling and disposal systems.

systems.

farmers to establish adequate animal waste handling and disposal technical assistance programs should be accelerated to enable them intensive animal husbandry operations. In addition, various solutions available in order to minimize water pollution to ensure that farmers are made aware of the problems and the

It is recommended that education programs be strengthened

Recommendation:

Available sometime during the summer of 1974.

Management Field Manual is being developed and should be development stage. In addition, an Agricultural Waste Control regulations for smaller operations are in the

E. PEST CONTROL PRODUCTS

Problem Description:

The aquatic environment of the Great Lakes system has been adversely impacted by certain pest control products. In mid to southern Lake Michigan, for example, the biomagnification of DDT in salmon and trout has prevented commercial sales. Both the United States and Canada have acted to restrict the use of pesticides shown to have a pollution potential. Many new pest control products have recently been introduced to replace older, objectionable products. The full environmental impact of these products is undocumented. It is essential, therefore, that research and monitoring efforts continue so that those pesticides reaching the aquatic ecosystem are identified and proper direction can be given to both research and regulatory agencies.

Present data on pest control product usage throughout the Great Lakes Basin are sketchy. In view of the difficulty and expense involved in pesticide monitoring, the assimilation of better information on the type and volume of pest control products applied in various locations would not only greatly assist in the design of monitoring efforts, it would be cost effective.

While pesticide utilization is a necessity in the production and storage of food, potential adverse effects upon the Great Lakes System can be minimized by maximizing the efficiency of applied pesticides. Maximum pest control through minimum pesticide use could be obtained by improvements in spray techniques and by development of a pest monitoring program. Some application techniques are crude and much of the pesticide used does not reach the target. Development of a pest monitoring program would enable growers to know when and if a pesticide should be applied. For some major pests this may mean a reduction of up to 50 percent in the amount of

this may mean a reduction of up to 50 percent in the amount of and if a pesticide should be applied. For some major pests of a pest monitoring program would enable growers to know when the pesticide used does not reach the target. Development of spray techniques and the development of a pest monitoring minimum pesticide use could be obtained by improvements in efficiency of applied pesticides. Maximum pest control through the Great Lakes system can be maintained by maximizing the production and storage of food, potentially adverse effects upon

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The aquatic environment of the Great Lakes system has

Problem Description:

B. PEST CONTROL PRODUCTS

pesticide applied.

Recommendation:

(1) Pest control product use inventories should be established and maintained by appropriate governmental agencies. Such inventories should be designed to systematically secure detailed pesticide usage information by small areas.

(2) Priority should be established so that existing and strengthened extension service mechanisms can implement process and product advances made through research activities related to maximizing efficiency of applied pesticides. In particular, this should include: (1) improvements in application equipment and techniques; and (2) developments in practical pest monitoring programs which would facilitate integration of cultural, biological and chemical pest control techniques.

and chemical pest control techniques.

products which would facilitate integration of cultural, biological techniques) and (3) developments in physical pest monitoring should include: (1) improvements in application equipment and maximizing efficiency of applied pesticides. In particular, this and product advances made through research activities related to strengthened extension service mechanisms can implement process

(2) Priority should be established so that existing and detailed pesticide usage information by small areas.

Such inventories should be designed to systematically assess established and maintained by appropriate governmental agencies.

(1) Past control product use inventories should be

Recommendations:

pesticide applied.

F. ROAD SALT USE AND STORAGE

Problem Description:

Transportation systems have both physical and chemical impacts on the aqueous environment during construction, maintenance, and use of highways, railroads, airfields, etc. The impact can be favorable and unfavorable. At least one aspect of the water quality pollution problem can be considered for early action where highway maintenance is considered. Road salts are in wide use within the watershed of the Great Lakes. Amounts applied to control snow and ice vary from storm to storm and within each of the political units considered. Application amounts also vary for open highways and with urban and metropolitan areas. It is difficult to curb this overall source of pollution to the Great Lakes because there is a trade off with safety.

(1) Salting practices should be reviewed at this time to reduce the amounts applied per storm per mile of road where application rates can be shown to be excessive. In urban areas, salting can be restricted to intersections of selected roads, opposite schools, etc., rather than in a continuous fashion as now practiced on many roads. Chemicals used to control snow and ice add to highway and vehicle maintenance costs and, for this reason, care is frequently used to prevent their wasteful use. However, examples may be cited where "chemical overkill" procedures have been employed.

(2) Significant ground-water pollution, and ultimately surface-water pollution, is occurring at salt storage areas located along highway systems. Stockpiles frequently are not covered or protected from exposure, and salt may remain on site during the non-salting season. Solution removal of salt from storage areas adds to the total amount of salt used with no beneficial result and contributes to unnecessary pollution. The total salt pollution load to the soil-water

pollution. The total salt pollution load to the salt-water with no beneficial result and contributes to unnecessary salt from storage areas add to the total amount of salt used on site during the non-salting seasons. Salinization removal of not covered or protected from exposure, and salt may remain located along highway systems. Groundwater frequently are surface-water pollution is occurring at salt storage areas.

(5) Significant ground-water pollution, and ultimately procedures have been employed.

However, examples may be cited where "chemical overkill" reason care is frequently used to prevent their wasteful use. Ice add to highway and vehicle maintenance costs and, for this reason, schools, etc., rather than in a continuous fashion salting can be restricted to intersections of selected roads. Application rates can be shown to be excessive. In urban areas, reduce the amount applied per storm per mile of road where

(1) Salting practices should be reviewed at this time to trade off with safety.

saline of pollution to the Great Lakes because there is a and metropolitan areas. It is difficult to curb this overall application amounts also vary for open highways and with urban storm to storm and within each of the political units considered. Amounts applied to control snow and ice very low Road salts are in wide use within the watershed of the Great for early action where highway maintenance is considered. aspect of the water quality pollution problem can be considered. The impact can be favorable and unfavorable. At least one maintenance, and use of highways, railroads, airfields, etc. impacts on the aquatic environment during construction.

Transportation systems have both physical and chemical

Problem Description:

2. ROAD SALT USE AND STORAGE

ground-water and surface-water systems can be reduced or eliminated at storage sites by the use of protective housings, appropriate covers that can be used on an annual basis, and by the construction of brine runoff storage basins. These brines at least can be recycled to the highway before being released to the watershed, insuring a prior beneficial use.

It is good management practice to reduce salt losses and to prevent or reduce local pollution that commonly is associated with salt storage areas. Ground-water flow rates beneath many of these sites are low in many cases, and the full impact of this pollution source is only slowly being recognized. Law suits are increasing in number as the source of pollution is being recongized, and tell-tail signs of salt pollution from these sources are becoming more obvious as vegetation kills become more extensive and noticeable adjacent to storage sites.

The State of Indiana has adopted a salt storage bin system on I-80 in 1973. Large cone-shaped buildings have been provided to protect the salt stockpiles. Drive-in facilities for loading and unloading are included. Permanent buildings of this type may be costly on an initial basis but will go a long way to controlling unnecessary pollution at concentrated sites.

A review of the management procedures probably can be achieved at the state or local level with existing personnel.

Recommendations:

(1) Highway and other officials should accelerate their studies and reviews of salting practices to reduce the use of

needs and review of solid practices to reduce the use of

(1) Highway and other officials should coordinate their

Recommendations:

achieved at the state or local level with existing personnel.

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or eliminated at storage sites by the use of protective
ground-water and surface-water systems can be reduced

excessive amounts of salts, both on major highways and in urban areas. They should also adopt, strengthen or otherwise modify their salt management procedures.

(2) Protective covers, preferably all-weather permanent housings, should be provided for salt storage areas. Brine collection facilities also would be helpful.

Organic matter which depletes dissolved oxygen. Sediment, of and by itself the highest volume pollutant, also acts as a transport agent for other pollutants, notably phosphates and pesticides.

The entry of these pollutants into the Great Lakes is accelerated by various land use activities. This results from the act of disturbing the land surface (such as plowing to plant crops or bulldozing to build residential subdivisions).

Probably the most significant efforts to reduce erosion and sedimentation have been those of land owners and operators, through soil and water conservation districts (in the U.S.) and the conservancy districts (in Canada). In the U.S. portion of the basin, almost half of the land is now considered degraded and is being treated. This is current conservation treatment is adequate to meet the conservation problem, such as erosion and sedimentation. Most of this work was done with technical assistance provided by the Soil Conservation Service (USDA) through congressional authorities during back to Public Law 74-76, the Soil Conservation Act of 1935. Cost sharing has been provided for much of this work through the Agricultural Stabilization and Conservation Service (USDA).

In Canada, neither the Federal or Provincial governments provide direct financial assistance to farmers for erosion control. Provincial capital grants are provided for farm drainage systems and water storage ponds. Design advice is

collection facilities also would be helpful.

(3) Protective covers, preferably all-weather permanent
modular salt management procedures.

areas. They should also adopt, strengthen or otherwise
excessive amounts of salt, both on major highways and in urban

G. SEDIMENT

Problem Description

Among the principal pollutants which, to a significant degree, result from land use activities are plant nutrients (nitrogen, phosphorus, etc.), pesticides, and organic matter which depletes dissolved oxygen. Sediment, of and by itself the highest volume pollutant, also acts as a transport agent for other pollutants, notably phosphates and pesticides.

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Service(USDA) through congressional authorization setting back technical assistance provided by the Soil Conservation erosion and sedimentation. Most of this work was done with is adequate to meet the conservation problems, such as adequately treated. That is, current conservation treatment of the basin, almost half of the land is now considered and the conservancy districts (in Canada). In the U.S., portion through soil and water conservation districts (in the U.S.) and sedimentation have been those of land owners and operators, probably the most significant efforts to reduce erosion

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Among the principal pollutants which, to a significant

Soil Description

C. SEDIMENT

available through extension programs.

Recommendations:

1. Some of the states and the Province have enacted legislation which will be helpful in reducing sediment pollution from land use activities. Implementation of these laws is urged by the Reference Group.
2. The Reference Group recommends that appropriate governmental jurisdictions which have not done so give high priority to the enactment of sediment control legislation with particular emphasis on urban and suburban areas.
3. Federal legislation has been enacted which relates to these problems. Two premier examples, in the United States, are the Coastal Zone Management Act of 1972 and the Federal Water Pollution Control Act (as amended, in 1972). The latter act contains a provision (Section 108) specifically regarding "Pollution Control in the Great Lakes" which carried an authorization for the appropriation of \$25 million. Another significant piece of legislation, the Rural Development Act of 1972, directs the Secretary of Agriculture to carry out a program of land inventory and monitoring which should provide valuable data for use in making wise land use decisions in the Great Lakes drainage basin.

The Reference Group recommends that the above laws be implemented to the fullest possible extent.

4. The U.S. Department of Agriculture's legislative authority provides landowners an opportunity to enter into long term contracts of from three to ten years with the government in return for technical and financial assistance to apply soil and

return for technical and financial assistance to apply soil and contours of from three to ten years with the government in provides landowners an opportunity to enter into long term

4. The U.S. Department of Agriculture's legislative authority implemented to the fullest possible extent.

The Reference Group recommends that the above laws be basin.

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3. The Reference Group recommends that appropriate governmental laws is urged by the Reference Group.

pollution from land use activities. Implementation of these legislation which will be helpful in reducing sediment

1. Some of the states and the province have enacted

Recommendations:

available through expansion programs.

water conservation practices which reduce soil erosion and sediment. The Reference Group recommends that adequate funding and staffing be provided to enable landowners and operators to apply conservation practices, according to sound conservation plans, as rapidly as practicable.